**Basic Lab Considerations for Enzymes Help Us Digest Food Lab**

**1. Set up**

a. What quantity of materials is needed for each group/student?

Each group (2 students), will need one 25mL graduated cylinder, 5 test tubes, a test tube rack, two 250 mL beaker, one 100mL beaker, 5 Glucose strips, a marker and tape for labeling test tubes, a 1mL pipet, 20mL of lactose solution, 10mL of Sucrose solution, 3mL of lactase solution, goggles and each student will need a pair of gloves.

b. Space use in room?

2 students at each lab station.

c. Lab stations clearly labeled?

Lab stations will be identified by tray with materials sitting on bench.

d. Sufficient work area for students?

The space on the lab bench is plenty of room for the students to complete the lab in their own area.

**2. Material distribution**

a. What materials do the students need?

Each group (2 students), will need one 25mL graduated cylinder, 5 test tubes, a test tube rack, one 250 mL beaker, 5 Glucose strips, a marker and tape for labeling test tubes, a 1mL pipet, 20mL of lactose solution, 10mL of Sucrose solution, 3mL of lactase solution, goggles, and each student will need a pair of gloves.

b. What is the most efficient way to get these to students?

Each lab station will have a tray with all lab materials needed except for the solutions. The solutions will be at the front of the room for students to obtain as they go through each activity.

**3. Pre Lab**

a. Expectations/objectives/purpose for the day

1. Recognize the difference between disaccharides and monosaccharides.
2. Identify the substrate, enzyme, and products of a reaction.
3. Identify the two monosaccharides that make up Lactose.
4. Define what an enzyme is and its structure and function.
5. Explain how sugars are broken down and digested.

b. Safety considerations

Students will use gloves while handling the solutions and inverting the tests tubes. They will also be required to wear safety goggles the whole lab. I will walk around to make sure the students are following these safety precautions the whole time.

c. Overview of lab set-up

Prior to the beginning of the lab, the teacher will put a tray with all the materials needed for each group at their lab station. The three different solutions will be at the front of the classroom for the students to obtain on their own when they get to the specific part of the lab calling for those solutions.

d. What to do if lab is not completed during the hour

If the lab is not finished within the hour, it will be continued the following day. The solutions the teacher made will be kept, but the students will not need to keep what they have.

e. How this lab fits into the curriculum

The understanding of the nature of enzymes is important in the curriculum to understand biochemistry reactions in cellular organisms.

f. Clean up

The test tubes, beakers, pipets, and graduated cylinders should be washed by students at the end of lab and returned to station on tray. Used glucose strips, gloves should be thrown away. Goggles should be placed back into the bin at the front of the classroom. And all lab benches should we wiped down with the cleaner and paper towels. I will clean the glassware holding the solutions and put away all of the students materials once they return everything to their station.

**4. Hand outs**

a. Procedure (can also be at lab stations)

**Experiment 1:**

**Procedure**

1. One member of your group should prepare Tube 1 with 10 mL of lactose solution.

2. Another member of your group should prepare Tube 2 with 10 mL of lactose solution and 1 mL of lactase solution. Put on a glove, put your thumb on the top of the tube and invert several times to mix the two solutions.

3. Wait 3 minutes to allow time for lactose to break down to glucose and galactose.

4. While you are waiting, both of the experimenters should get a test strip. Notice that the original color of the test strip is aqua. In the next step, if the test strip turns green, olive or brown, this will indicate that glucose is present.

1. After the 3 minute wait, each experimenter should dip a glucose test strip into the solution in his or her tube until the pad is submerged, and then remove the test strip immediately and run the edge of the strip against the rim of the tube to wipe off excess liquid.

**Experiment 2:**

**Procedure**

1. One member of your group should prepare a tube with 10 mL of sucrose solution and 1 mL of lactase solution. Put on a glove, put your thumb on the top of the tube and invert several times to mix the two solutions.

2. Wait 3 minutes to allow time for digestion of sucrose.

3. Dip a glucose test strip into the solution until the pad is submerged, and then remove the test strip immediately and run the edge of the strip against the rim of the tube to wipe off excess liquid.

**Experiment 3:**

**Procedure**

1. One member of your group should prepare Tube 1 with 10 mL of milk.

2. Another member of your group should prepare Tube 2 with 10 mL of milk and 1 mL of lactase solution. Put on a glove, put your thumb on the top of the tube and invert several times to mix the milk and lactase solution.

3. Wait 3 minutes to allow time for digestion of the sugar in milk.

4. After the 3 minute wait, each experimenter should dip a glucose test strip into the solution in his or her tube until the pad is submerged, and then remove the test strip immediately and run the edge of the strip against the rim of the tube to wipe off excess liquid.

b. Data recording

Students will record their data in the spaces provided on the hand-out they receive.

c. Application/analysis

Students will be asked what they think happens if your body cannot produce the enzyme lactase, what will happen to lactose in your body. They will also understand what other foods will result in discomfort from being lactose-intolerant. They will understand this at the end of the lab.

**5. Assessment**

a. How do I assess whether or not students are doing lab properly?

They will be assessed on the answers to their questions in the lab. I will walk around to each group during each activity to see what their results were to be sure they were not making mistakes.

b. What will I have students do with their data?

Their data will help them answer the questions to the lab to give them a more in-depth understanding. At the end they will turn their hand-outs in to the teacher.

c. How will I know that students have understood the concept the lab was

illustrating?

The answers the students give to the questions following each activity will show whether or not they understood the concepts being taught.

**6. Post lab**

a. What to do with data/discussion

At the end of the lab I will ask the entire class what their results were for each experiment. We will then go over the answers to the questions, with the students being the ones answering them.

b. Taking stock of student progress

The completion of the student hand-out will show that they made progress throughout the lab; learning more complex concepts about enzymes as they move on to each experiment.

c. What to do if not completed

The teacher will continue the post-lab discussion the following day of class.

d. Preview of tomorrow

The students will move on to learning about the effects on enzyme activity.